

## UNDEFEATABLE TRANSFORMATION FOR VIRTUAL MACHINE I/O OPERATIONS

### ABSTRACT OF THE DISCLOSURE

I/O operations between a virtual machine (VM) and a device external to the VM are monitored by a virtual machine monitor (VMM). Data passing between the VM and the external device is transformed by the VMM, in some cases only when a predetermined filtering or triggering condition is met. Because the VMM, and thus the transformation operation, is transparent to the VM, the transformation cannot be prevented or undone or even affected by any action by a user of the VM. Examples of the non-defeatable transformation of I/O data include generating display overlays such as banners, masking out portions of a display, encryption, compression and network shaping such as bandwidth limiting.